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Diarrhoeal disease outbreak in Free State Province, February 2012

A suspected diarrhoeal disease outbreak was reported in Tshepong Township, near Verkeerdevlei (northeast of Bloemfontein) in Free State Province during February 2012. Investigations revealed a total of 337 cases, of which 60% (190/317) were female. The age of cases ranged from 0 to 97 years (median 11 years), with 73% of cases aged 5-19 years. A spot map showed that cases were spatially dispersed throughout Tshepong Township, and that no cases were detected in the neighbouring town of Verkeerdevlei.

Laboratory testing of four stool samples revealed the presence of multiple pathogens, including *Shigella dysenteriae* (n=2, 50%), norovirus (n=4, 100%) and astrovirus (n=2, 50%). Environmental investigations indicated potable water contamination at numerous water sampling points in Tshepong Township. Suboptimal potable water chlorination and sewage spillage with resultant groundwater contamination are implicated as likely causes of the outbreak.

As an immediate preventive measure, environmental health practitioners intensified health promotion regarding safe hygiene and sanitation practices within the community. Issues regarding the potable water quality are currently being addressed by officials, but the residents of this community and the surrounding areas remain at high risk for developing diarrhoeal illnesses. Given that many communities countrywide are facing similar challenges with safe potable water supply, such outbreaks may be increasingly common in the future and healthcare workers should be vigilant for such events.

Source: Division of Surveillance, Outbreak Response, FELTP and Travel Health, and Centre for Enteric Diseases, NICD-NHLS. Free State Province Department of Health.

Malaria

An increase in malaria cases is anticipated following the escalation in travel during the coming Easter celebrations and April public holidays. It is currently the malaria season in southern Africa. Preliminary data from the South African National Department of Health Malaria Control Programme indicates a seasonal peak in the number of cases and deaths observed in January (2 267 cases, 16 deaths) and February (968 cases, 10 deaths) 2012. Fewer cases and deaths were, however, observed in the most recent month compared to February 2011 (1237 cases, 13 deaths). Of the 968 cases notified in February 2012, 67% (n=652) originate from the endemic provinces of KwaZulu-Natal, Mpumalanga and Limpopo, while 31% (n=300) were diagnosed in Gauteng Province, where the vast majority of cases are travel-related. A handful of cases also were observed in other provinces.

An appropriate course of malaria chemoprophylaxis (mefloquine, doxycycline or atova-

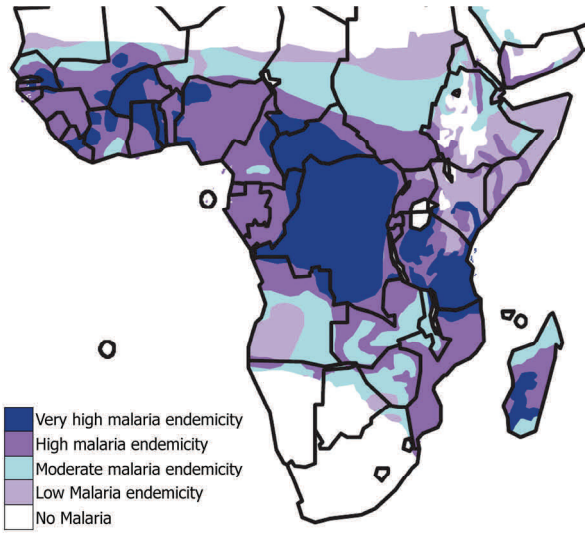

Figure 1: Sub-Saharan Africa malaria distribution and endemicity, 2003 (adapted from UNICEF & RBM, 2007, Progress in Intervention Coverage)

quone-proguanil [Malanil®]) should be encouraged for travellers to risk areas within southern Africa and abroad. Figure 1 illustrates the distribution and endemicity in sub-Saharan Africa. Travellers should also be advised to take preventive measures to reduce mosquito bites, including: wearing long sleeves and trousers during the afternoon, evening and early morning; use of insect repellents (containing DEET); sleeping under insecticide-treated bed nets; keeping windows and doors closed/screened, and use of insecticide aerosol and/or coils at night.

Healthcare workers throughout the country are urged to maintain a high index of suspicion for malaria in febrile patients post-travel to a malaria-risk area, as well as in patients with unexplained fever even in the absence of a travel history. Malaria cannot be diagnosed on clinical grounds alone and a blood test is urgently required for smear microscopy, rapid malaria diagnostic test, or both. An initial negative result does not exclude infection and successive testing should be carried out every 12-24 hours until the patient recovers or an alternative diagnosis is confirmed. Malaria should be considered in any febrile patient in whom an alternative diagnosis is not readily apparent, especially if the patient's platelet count is low. Thrombocytopenia is a very common (but not invariable) finding in patients with both uncomplicated and severe malaria.

Without appropriate treatment, malaria can progress rapidly to severe disease and death. Confirmed malaria cases must be notified to the Department of Health. Artemether-lumefantrine (Coartem®) is first-line treatment for uncomplicated falciparum malaria (except in children <6 months of age and in the first tri -mester of pregnancy). Alternatively, quinine plus either doxycycline or clindamycin can be used. Quinine plus clindamycin is the treatment of choice in uncomplicated malaria cases for those in the first trimester of pregnancy and in children ≤5 kg. Where available, intravenous artesunate is the preferred treatment for both adults and children with severe malaria, and also in the 2nd and 3rd trimester of pregnancy. Alternatively, intravenous quinine should be used for cases of severe malaria. It is important to exclude hypoglycaemia in patients with a depressed mental state. Detailed information on the clinical presentation, diagnosis and management of malaria cases, as well as the South African malaria risk areas, can be found in the Department of Health Guidelines for the Treatment of Malaria in South Africa, 2010.

Malaria mosquito population monitoring in Mpumalanga Province

Entomological surveillance is used to monitor malaria vector population dynamics, which assists the malaria control programme to prioritise areas for control operations. The NICD provides a service for the identification of medically important arthropods. Malaria vector mosquitoes are routinely identified by PCR for Limpopo, KwaZulu-Natal and Mpumalanga Provinces' Malaria Control Programmes.

Mpumalanga Province is a low malaria transmission area that is susceptible to malaria epidemics. Between November and December 2011, 170 mosquito larvae were collected in the Nkomazi District of the province (Fig. 2, inset) and reared to the adult stage. Of these, 165 (97%) were *Anopheles gambiae* complex and five (3%) were *An. funestus* group. Subsequent PCR-based identification to species level showed that the majority of the specimens were *An. merus* (n=138, 84%), followed by *An. quadriannulatus* (n=20, 12%) and one *An. arabiensis* (<1%). Eleven samples, including the five *An. funestus* group specimens, could

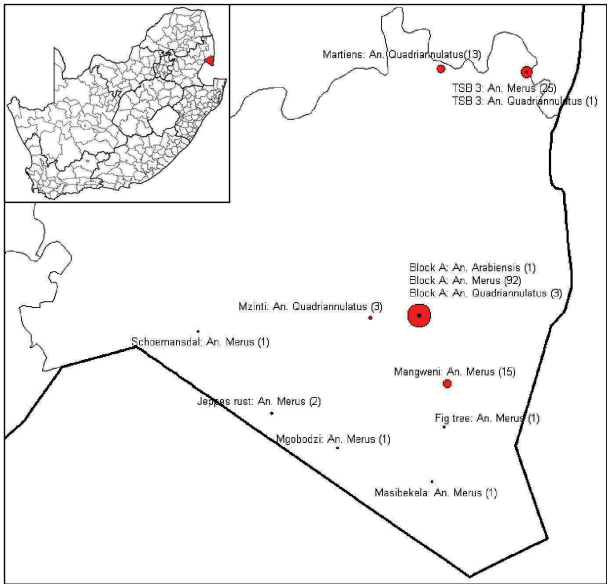

Figure 2: Map illustrating vector surveillance sites and species identified, Nkomazi District, Mpumalanga Province. (Courtesy of Dr. Ben Sartorius, School of Public Health, University of the Witwatersrand)

not be identified to species, most likely a result of DNA degradation due to difficulty in preserving mosquito samples under field conditions. *Anopheles arabiensis* is a major vector of malaria and *An. merus* is listed as a minor vector in some regions, but has not been implicated in malaria transmission in Mpumalanga Province. *Anopheles quadriannulatus* is a closely-related non-vector. Figure 2 illustrates the geographical distribution of species reported here.

Sampling for the period reported here indicates very low numbers (n=1) of the main malaria vector, *An. arabiensis.* This is indicative of an effective vector control programme in the province. Unfortunately, infected vector mosquitoes outside of South Africa (mainly from Mozambique) can be transported into the province; these imported mosquitoes can feed on local people and transmit malaria. However, in the presence of an effective vector control programme they should be killed by residual insecticides in sprayed homes before they can feed again or breed locally.

Source: Centre for Opportunistic, Tropical and Hospital Infections, and Division of Surveillance, Outbreak Response, FELTP and Travel Health, NICD-NHLS. Malaria Control Programme, National Department of Health. School of Public Health, University of the Witwatersrand.

Rabies

Outbreak in KZN

In the February 2012 Communiqué, we reported an outbreak of rabies affecting predominantly dogs in Bergville, Winterton, Emmaus, Colenso, Loskop and surrounding areas in KwaZulu-Natal Province. The outbreak is ongoing and new cases of animal rabies continue to be detected by animal health authorities. An intensive animal vaccination campaign is currently underway to control the outbreak. A number of human exposures requiring post-exposure prophylaxis (PEP) have also been reported; however there have been no clinical cases of suspected human rabies disease reported to the NICD-NHLS to date. We continue to encourage healthcare workers in the affected and surrounding areas to familiarise themselves with the guidelines for post-exposure prophylaxis (PEP) of rabies, including:

- Prompt wound care: copious washing of the wound with soap and water, and application of antiseptic (preferably povidone iodine solution)
- Administration of rabies vaccine: a series of 4 doses administered intramuscularly in the deltoid muscle (or anterolateral thigh in small children or infants) as per protocol. Note that rabies vaccine should never be administered into the buttocks.
- Administration of rabies immunoglobulin (RIG) in category 3 exposures. In patients with multiple wounds, RIG should be diluted with normal saline and infiltrated into all wounds.

Rabies disease should be suspected in any patient presenting with an acute neurological syndrome (encephalitis). Early symptoms may include a sense of apprehension, headache, fever, and hyperaesthesia at the bite site; later symptoms may include hallucinations, hypersalivation and hydrophobia. Initially patients are lucid, but spasms, coma and death follow within days after the onset of symptoms. The incubation period for rabies is typically 1-3 months, but may vary from <1 week to >1 year. Obtaining a detailed history regarding bites, scratches or other animal contact (e.g. licking of mucous membranes) is important. In such cases, attempt to confirm the diagnosis through appropriate laboratory investigations, exclude other treatable causes of illness, notify the Department of Health, and contact the NICD Hotline (082-883-9920) to discuss the case and arrange for laboratory testing.

New case report

A confirmed case of human rabies occurred in Limpopo Province during January 2012. The patient, a 2-year-old male from the village of Chebeng on the outskirts of Polokwane, sustained a dog bite on his forehead (a category 3 exposure) on 13 January. Medical care was sought and the patient was commenced on a course of rabies vaccine. Although rabies immunoglobulin (RIG) would be indicated in such a case, the patient was not referred and RIG was not given. The patient developed fever, confusion and inability to walk on 29 January and died three days later at home. Rabies was confirmed by detection of virus antigen using fluorescent antibody tests on a post-mortem brain biopsy specimen.

Facial injuries sustained from rabid animal attacks are of particular concern as human rabies in such cases often ensues after a short incubation period, and therefore timely administration of PEP is essential. RIG must be infiltrated into all wounds, and although this can be a very painful process, especially in children and in the case of facial wounds, local anaesthetic must never be used to facilitate RIG administration in any exposures related to potentially rabid animals. Use of local anaesthetic or suturing of wounds may facilitate the spread of the virus and should be actively discouraged.

Six human rabies cases were confirmed in South Africa during 2011. This is the first laboratory-confirmed rabies case detected in 2012 to date. A case of clinical rabies was reported in the February 2012 Communiqué in whom the diagnosis of rabies was highly likely but laboratory testing was inconclusive. These statistics underestimate the true burden of the disease as few cases are clinically suspected, reported, or appropriately investigated. Obtaining a definitive laboratory diagnosis (ante- or post-mortem) has important implications for individual case management and is critical to rabies public health prevention and response efforts in South Africa.

Source: Division of Surveillance, Outbreak Response, FELTP and Travel Health, Centre for Emerging and Zoonotic Diseases.

Foodborne illness outbreaks

We detail one foodborne illness outbreak reported to the NICD in February 2012, address the medical screening policy for food handlers, and provide an update on the NICD foodborne illness investigation pack.

Dr. J.S. Moroka Sub-district, north-western corner of Mpumalanga Province

On 24 February, 84 students and staff members (aged 17 – 61 years) from an agricultural college presented to two local health facilities with symptoms including diarrhoea and abdominal cramps. The onset of symptoms ranged between 19h00 the previous day to 03h00 that morning. They had consumed three meals the previous day, and the implicated food items included beef sausage, mutton stew, pap sprinkled with cheese and green salad, chicken stew and sweet potato. Investigations were undertaken by sub-district environmental health practitioners and communicable disease control coordinators, which included interviews with 114 people, and collection of clinical and environmental samples. Stool specimens were collected from 11 cases. Mutton, cheese, chicken, and water samples, as well as surface swabs and hand/throat swabs from asymptomatic food handlers were collected and submitted to the NHLS Infection Control Services Laboratory, Johannesburg for testing. *Clostridium perfringens* was identified from 10 of the 11 stool specimens. High bacterial and yeast counts were evident in all the food samples. *Staphylococcus aureus* enterotoxin group C was identified in the cheese sample non-typhoidal *Salmonella* sp. in the mutton sample. *Escherichia coli* was also identified from a chicken sample and 4 water samples indicating the likelihood of faecal contamination.

An environmental inspection was conducted at the college kitchen on 24 February. There was no piped potable water supply to the college, and water was delivered by municipal trucks and stored on site in 'new' refuse bins. Another important finding of the investigation was a non-functional freezer with malfunctioning thermometer resulting in inadequate storage conditions for the bulk meat stored there. Environmental health practitioners provided recommendations to the catering manager, which included training of food handlers on food safety (Five Keys to Safer Food), hygiene and hand washing. Health promotion messages were also provided to the students.

Medical screening policy for food handlers

Regular monitoring and surveillance by health authorities and management of the food handling process are critical components in the prevention of foodborne diseases. The National Department of Health considers pre-employment and routine medical examination of food handlers as being not cost-effective and unreliable in the prevention of foodborne diseases, and recommends that it should, therefore, not be required by health authorities because of the following reasons:

- rapid staff turnover and difficulty in keeping track of food handlers
- routine examinations may lead to a false sense of safety and cause negligence with regard to general hygienic practices and personal hygiene
- medical examinations are costly and do not guarantee the detection of more than a small proportion of carriers of pathogenic organisms
- screening of stool specimens from food handlers is not cost-beneficial and the identification of a carrier is not likely to make a significant contribution to the control of foodborne diseases, and
- infection may occur after the examinations.

Effective preventive measures and education of food handlers in hygienic practices must be emphasised by using the WHO five keys to safer food. See additional details in the Department of Health's Guidelines for the Management and Health Surveillance of Food Handlers.

Updated NICD foodborne illness investigation pack

The Outbreak Response Unit has updated the Quick Reference Guide for the Investigation of Foodborne Disease Outbreaks, and has compiled a NICD-NHLS handbook on the management of foodborne illness clusters and outbreaks for laboratory personnel and public health officials. These documents are available on the NICD website.

Source: Division of Surveillance, Outbreak Response, FELTP and Travel Health, and Enteric Diseases Centre, NICD-NHLS; Mpumalanga Province and Dr JS Moroka Sub-district Department of Health; NHLS Infection Control Services Laboratory, Johannesburg; and National Department of Health, Food Control and Safety.

Influenza

2011

According to the Viral Watch and Severe Acute Respiratory Illness (SARI) surveillance programmes, the 2011 influenza season started in epidemiological weeks 18 and 19 (weeks starting 2 and 9 May) for influenza-like illness (ILI) and SARI cases respectively. In Viral Watch (measuring ILI), the season peaked in week 23 (week starting 6 June) and started to decline after week 29 (week starting 18 July). During this period 874/1 040 (84%) of influenza cases identified were influenza A(H1N1)pdm09. During the last five months of the year a further 149 influenza detections were made; of these 83 (56%) were identified as influenza B and 50 (34%) were influenza A(H3N2). In the SARI surveillance programme, the 2011 influenza season had two distinct peaks. The first peak, predominated by A(H1N1)pdm09 in week 24 (week starting 13 June) was followed by a second peak, predominated by influenza A (H3N2) and influenza B, in week 39 (week starting 26 September).

2012

The 2012 influenza season has not yet started but a few sporadic cases have been confirmed. For the period 2 January to 4 March 2012, 34 specimens were received from Viral Watch sites. Influenza A(H3N2) was detected in two specimens, and influenza B in three specimens. Three of these cases had travelled to the northern hemisphere prior to illness onset. For the same period, 742 patients with SARI were enrolled at the four sentinel sites (Chris Hani Baragwanath Hospital, Edendale Hospital, Klerksdorp-Tshepong Hospital Complex, and Agincourt). Of the 702 patients that have been tested for influenza, one patient tested positive for influenza A(H1N1)pdm09.

2012 southern hemisphere trivalent influenza vaccine

The trivalent 2012 southern hemisphere influenza vaccine formulation is identical to that of the 2011 vaccine:

- an A/California/7/2009 (H1N1)pdm09-like virus;
- an A/Perth/16/2009 (H3N2)-like virus;
- a B/Brisbane/60/2008-like virus.

Vaccine is indicated for the following priority groups:

- Persons (adults or children) who are at high risk for influenza and its complications because of underlying medical conditions for which they are receiving regular medical care, including: chronic pulmonary or cardiac disease, chronic renal disease, diabetes mellitus and similar metabolic disorders, individuals who are immunosuppressed (including HIV-infected persons with CD4 counts >100 cells/µl), and individuals who are morbidly obese (BMI≥40).

- Pregnant women – irrespective of stage of pregnancy.
- Residents of old-age homes, chronic care and rehabilitation institutions.
- Children on long-term aspirin therapy.
- Medical and nursing staff in contact with high-risk persons.
- Adults and children who are family contacts of high-risk persons.
- All persons over the age of 65 years.
- Any person wishing to protect themselves from the risk of contracting influenza, especially in industrial settings, where large-scale absenteeism could cause significant economic losses.

Influenza vaccine is currently available in the private sector and should be available imminently in the public sector. Healthcare workers should encourage people to be vaccinated as soon as possible, since it takes about two weeks for protective antibodies to develop. Persons who were vaccinated in 2011 should be vaccinated again in 2012 as influenza vaccines do not offer long lasting protection. Detailed recommendations, dosages and contraindications regarding the 2012 influenza vaccine were recently published in the South African Medical Journal.

2012-2013 northern hemisphere trivalent influenza vaccine

The WHO has recommended changes to the H3N2 and B vaccine viruses for use in the 2012-2013 influenza season (northern hemisphere winter). The trivalent vaccine formulation will include:

- an A/California/7/2009 (H1N1)pdm09-like virus;
- an A/Victoria/361/2011 (H3N2)-like virus;
- a B/Wisconsin/1/2010-like virus

Source: Centre for Respiratory Diseases and Meningitis, NICD-NHLS

Beyond our borders: infectious disease risks for travellers

The "Beyond Our Borders" column focuses on selected and current international diseases that may affect South Africans travelling abroad. Increased travel may be expected during the coming Easter holidays. Healthcare workers are encouraged to be vigilant for travel-associated infections in returning travellers, as well as educate departing travellers with regards appropriate preventive measures.

Cholera: Africa

Alert: Between January and March 2012, a number of African countries are reportedly experiencing increased cholera activity and outbreaks (Figure). During February and March 2012, these include but are not limited to the following:

- Malawi: up to 103 people infected as a direct result of the flooding in late January 2012 in the Nsanje and Chikhwawa districts (bordering Mozambique).
- Rwanda: 13 cholera cases have been reported in travellers from the DRC.
- Nigeria: a sharp increase in cholera cases has been observed in Kaduna and Gombe districts; 14 cases reported in the first 5 weeks of 2012 and 26 cases with 1 death reported in week 6.
- Republic of the Congo: 340 cases and 9 deaths were reported since June 2011 in the northern district of Likouala. The epidemic has affected a 500 km-radius area stretching from Betou to Liranga, and it continues to spread.

Figure: African countries reporting increased cholera activity and/or outbreaks during January-March 2012

- Congo DR: 644 people have died and 26 000 infected since January 2011. At least 4 people were reported dead in the village of Muanda, South-west of Kinshasa. In Goma, 50 deaths have been reported in the past few weeks.
- Mozambique: At least 20 cases are reported every month from Inhaca Island (32 km from Maputo). Cases are reportedly increasing due to a lack of safe water supply and non-hygienic practices.
- Uganda: 2 people died, and 14 were admitted to hospital in the Mbale District. A total of 280 cases were reported in the districts of Kasese, Mbale, Sironko, Bududa and Buliisa.
- Guinea: A total of 83 cases and 14 deaths were recorded in the coastal regions of Forecariah (Kindia region) and Boffa (Bokke region) over the past month.
- Sierra Leone: 2 137 cases and 24 deaths have been recorded during outbreaks in the districts of Port Loko, Kambia and Pujenhun.

The disease: *Vibrio cholerae* is an acute bacterial enteric disease that in most cases is asymptomatic or causes mild diarrhoea. In its severe form, it is characterized by the sudden onset of profuse watery diarrhoea which is painless. Nausea and vomiting may also occur. If left untreated it can lead to rapid dehydration, acidosis, circulatory collapse, and renal failure. Transmission is through the ingestion of food or water contaminated with faeces of infected individuals. The incubation period may range from a few hours to 5 days (usually 2 – 3 days). Diagnosis is by stool culture, and management is centred on aggressive rehydration and close monitoring.

Advice to travellers: Travellers are advised to take precautions when consuming food or water. Drink bottled water or water brought to a rolling boil for 1 minute before you drink it. Avoid ice or popsicles made from contaminated water. Eat food that had been thoroughly cooked, and eat it while still hot and steaming. Eat fruit and vegetables that can be peeled, peeled them yourself after washing of hands, and do not eat the peelings. Avoid foods and beverages from street vendors. Vaccination may not be completely effective.

Ross River virus infection: Australia

Alert: There have been 62 reported cases in the city of Cockburn (South Australia) since 1 January 2012, almost triple the number at the same time last year. State-wide, 511 cases were reported since January 2012, an increase from 245 cases detected throughout 2010, and 245 cases at the same time in 2011.

The Disease: Ross River virus is a zoonotic infection transmitted from infected animals to humans through the bite of certain *Culex* and *Aedes* mosquito species. Disease presents after an incubation period of 3 to 21 days with malaise, fatigue, myalgia, arthralgia, low-grade fever and a maculopapular rash.

Advice to travellers: Travellers are advised to take precautions to avoid being bitten by mosquitoes. This can be achieved by the use of mosquito-repellents containing DEET, staying in well screened or air-conditioned buildings, and wearing loose, light-coloured, long-sleeved clothing when outdoors. The various vector species bite at different times of the day, but typically breed in warm, humid climates near bodies of fresh water, and most are active during the late afternoon (dusk), a few hours after sunset, and again at dawn.

Lassa fever: Nigeria

Alert: Twelve Nigerian states including Edo, Taraba, Borno, Gombe, Yobe, Plateau, Nassarawa, Ebonyi, Ondo, Rivers, Anambra and Lagos have been affected by the current epidemic, with over 400 cases and 40 deaths reported since the beginning of 2012. The deaths include 6 healthcare workers.

The disease: Lassa fever is an acute viral illness. *Mastomys* rodents, which often live in and around homes, shed the virus in urine and droppings. Thereafter, the virus may be transmitted through direct contact with these materials, through objects or eating food contaminated with these materials, through wounds, or when excreta are aerosolised and inhaled. Infection may also occur via direct contact with the infected rodents when they are caught and prepared for food. Lassa fever may also spread from person-to-person through direct contact with blood, tissue, or body fluids of an infected individual. After an incubation period of 5 to 16 days, this disease presents with gradual onset of malaise, fever and gastrointestinal symptoms; cough, chest pain and sore throat are also common initial symptoms. Over 80% of cases are asymptomatic or mild,

but severe multisystem disease can manifest with hypotension, shock, pleural/pericardial effusions, haemorrhage, and neurological findings (e.g. seizures, encephalopathy). Diagnosis is through ELISA or PCR, and ribavirin is indicated for treatment of severe cases.

Advice to travellers: Travellers should avoid contact with rodents or with sick persons and their body fluids. Food should be kept in rodent-proof containers, and households should be kept clean to avoid attracting rodents.

Chikungunya: Malaysia

Alert: Twenty-two students and lecturers of a private college in Selangor tested positive for the infection after returning from a course on Pangkor Island in Perak.

The disease: Chikungunya virus is transmitted to humans by the bite of the *Aedes aegypti* mosquito. The incubation period ranges from 2 to 10 days followed by the sudden onset of malaise, fever, arthralgia, backache and headache. A maculopapular rash occurs in up to 50% of cases. Acute illness typically lasts a few days, but residual arthralgia and malaise can persist for months or even years.some patients have prolonged fatigue that can last several weeks. Pregnancy and infancy are risk factors for severe disease, although fatalities are rare and are usually associated with advanced age. Treatment is symptomatic.

Advice to travellers: Travellers are advised to take precautions to avoid being bitten by mosquitoes. This can be achieved by the use of mosquito-repellents containing DEET, staying in well screened or air-conditioned buildings, and wearing loose, light-coloured, long-sleeved clothing when outdoors. The various vector species bite at different times of the day, but typically breed in warm, humid climates near bodies of fresh water, and most are active during the late afternoon (dusk), a few hours after sunset, and again at dawn.

Typhoid fever: Zimbabwe

Alert: Since 10 October 2011, Harare city has experienced an outbreak with a cumulative total of 3 538 cases reported as of 26 February 2012. A total of 2 443 cases was detected since the beginning of 2012. Infection is widespread throughout the city, with the suburb of Kuwadzana reporting the highest proportion of cases in the most recent weeks.

The disease: *Salmonella* Typhi, the causative agent of typhoid fever, is transmitted through drinking water or food contaminated with faeces of infected persons. Disease presentation is typically non-specific, with fever, headache, constipation, malaise, chills and myalgia as the commonest symptoms. There may be mild vomiting, and diarrhoea is uncommon. Severe disease may present with confusion, delirium, intestinal perforation or haemorrhage and may be fatal. Third-generation cephalosporins and fluoroquinolones are recommended for treating the disease.

Advice to travellers: Travellers are advised to take precautions when consuming food or water. Drink bottled water or water brought to a rolling boil for 1 minute before you drink it. Avoid ice or popsicles made from contaminated water. Eat food that had been thoroughly cooked, and eat it while still hot and steaming. Eat fruit and vegetables that can be peeled, peeled them yourself after washing of hands, and do not eat the peelings. Avoid foods and beverages from street vendors. Vaccination may not be completely effective.

References and additional reading: ProMED-Mail, World Health Organization, US Centers for Disease Control and Prevention, European Centres for Disease Prevention and Control.

Source: Public health registrars, University of Witwatersrand. Division of Surveillance, Outbreak Response, Travel Health and FELTP, NICD-NHLS.

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